

2021 Castro Valley Junior Math Tournament

Elementary School Division Problems

Important Information

Read the tournament details (<https://www.cvhsmath.org/cvjmt/tournament-details/>) and the rules (<https://www.cvhsmath.org/cvjmt/tournament-rules/>) before you begin. Unless otherwise specified, answers do not need to be simplified, but they must be exact. Unless otherwise specified, diagrams are not necessarily drawn to scale. Submissions are due at midnight on January 30th. Send questions to cvmualphatheta@gmail.com.

1 Moocraft

Bessie the Cow's new hobby is trying to beat the video game Moocraft as fast as possible. On the first day, Bessie finished Moocraft in 40 minutes. The next day, Bessie finished Moocraft in three-fourths of the time it took the day before. On the third day, Bessie's time is five-sevenths of the time on the second day. How many seconds did it take for Bessie to complete Moocraft on the third day? Round your answer to the nearest integer.

2 Farmer Pearson's Pears

Cowboy Alex just ran out of fresh fruit! He decided to visit Farmer Pearson for some of his world-famous pears. Farmer Pearson puts together 18 pears in one pack and he only sells whole packs. If Cowboy Alex wants to buy at least five dozen pears, how many packs does he need to buy?

3 Cowbe

Bessie the Cow found a cube. She randomly chose one corner of the cube, and Elsie randomly chose a different corner of the cube. What is the probability that the corner which Bessie chose and the corner which Elsie chose are connected by an edge of the cube? Your answer must be exact.

4 Moolan

On a trip to China, Bessie the Cow met a cow named Moolan. Apparently, Moolan was once a great cow warrior! If Bessie triples Moolan's age and subtracts 50, she gets her own age. If Bessie quadruples her own age and subtracts 53, she gets Moolan's age. How old is Moolan?

5 Accountant

Bessie the Cow is counting her siblings' money to determine how much allowance they should get. Bobby has \$21 less than Billy. Bailey has \$13 more than Billy. Bailey has \$17 less than Betty. How many more dollars does Betty have than Bobby?

6 Moovie Night

Farmer Julia built a new theater for Bessie the Cow and her friends! Bessie likes to eat popcorn and drink Cocow-Cola when watching moovies. Bessie drinks 8 grams of Cocow-Cola for every 10 grams of popcorn that she eats. If the total mass of the popcorn and the Cocow-Cola that she consumed is 3060 grams, how many grams of popcorn did she eat?

7 Cowculus

Bessie the Cow really enjoys doing math, so she decided to order two cowculus books from the Barnyard Bazaar: the first book is a cowculus textbook, and the second is a cowculus workbook. When they arrived, Bessie noticed that the books were really heavy! The textbook's weight is 20% less than the workbook's weight. The workbook weighs 10 pounds more than the textbook. What is the combined weight of the two cowculus books in pounds?

8 Pocowmon Cards

Farmer Julia bought some Pocowmon cards for her cows! While Bessie the Cow and her sister, Bailey the Cow are trading their Pocowmon cards, they notice something interesting. Bessie tells Bailey, "If you give me 4 cards, the ratio between the number of cards I have and the number of cards you have will be 3 : 2." Bailey then tells Bessie, "If you give me 18 cards, I will have four times as many cards as you." How many Pocowmon cards does Bessie have?

9 Spot the Brown Cows

On Rancher Cedric's farm, there are 100 cows. 41 are calves, and 15 of the calves have brown spots. 45 of the cows are not calves and don't have brown spots. How many cows have brown spots?

10 Look Mom No Proof!

Bessie the Cow found a website called <https://vixra.org/> which mostly publishes scientific nonsense. There's a paper (<https://vixra.org/abs/2008.0229>) which presents a simple method that supposedly checks whether integers greater than 5 are prime. It makes the following statement without proof:

The answer to whether the given numbers are prime numbers is to check that:

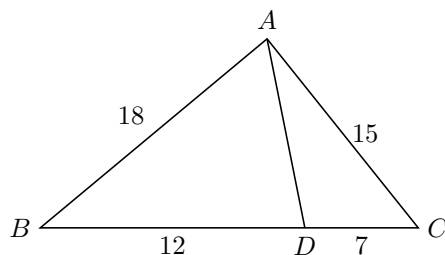
- The numbers are not even numbers (the last digit is not divisible by 2);
- The last digit of numbers is not 5;
- The sum of the digits of each of the remaining numbers is not divisible by 3.

A number that meets the above criteria is either a prime or a power [of a] prime.

Find a counterexample that disproves this claim. (This problem has multiple correct answers. You only need to find one of them.)

11 Holy Cow, A New Pen!

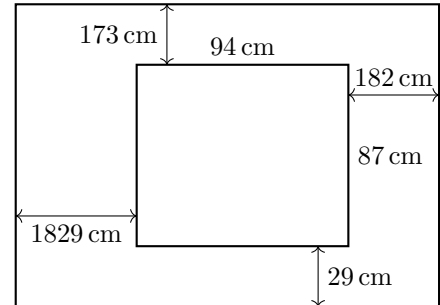
Cowboy Alex built another pen for his farm animals. This time, the pen is in the shape of the triangle shown in this figure and its side lengths are 18, 15, and 19 feet. He divides the pen into two parts by building a straight fence from point A to point D , where point D is 12 feet away from point B and 7 feet away



from point C . What is the ratio between the area of the left part and the area of the right part?

12 Moodern Art

Bessie the Cow created a new painting. It is in the shape of a rectangle 87 centimeters tall and 94 centimeters wide. She hangs it on a rectangular wall such that the top edge of the painting is 173 centimeters away from the top edge of the wall, the left edge of the painting is 1829 centimeters away from the left edge of the wall, the right edge of the painting is 182 centimeters away from the right edge of the wall, and the bottom edge of the painting is 29 centimeters away from the bottom edge of the wall. What is the area of the part of the wall that is not covered by the painting?



13 Revomootion

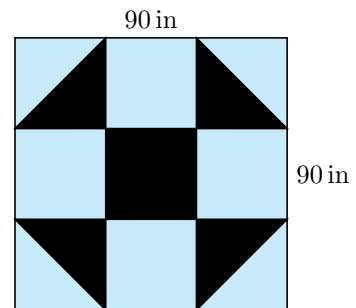
Farmer John's cows are planning a revolution to overthrow him! The 42 cows plan to distribute themselves among 6 pastures. To make sure Farmer John doesn't get suspicious, there must be at least two cows in each pasture, each pasture must have a different number of cows, and no pasture can have exactly 3 or 5 cows. To help the cows calculate their chance of succeeding, find the greatest number of cows that can be in any one pasture.

14 On the Moove

Bessie the Cow and her sister Bailey the Cow leave their barn at the same time, running at a constant speed on a narrow and straight road. Bessie went northbound traveling at 42 miles per hour. After 2 hours, Bailey is 30 miles south of Bessie. What was Bailey's speed in miles per hour and which direction was she traveling in?

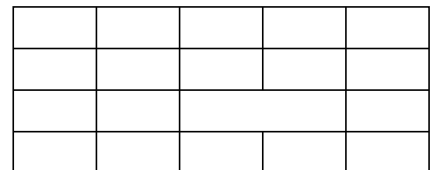
15 Cowld

Cowboy Alex wants to make a giant blanket for his cows with a specific pattern because they are cold. If the blanket uses the pattern 36 times and one side of the pattern is 90 inches long, how many square inches of black fabric will he need to make the blanket? This diagram is drawn to scale. Each of the small squares in the pattern is 30 in by 30 in.



16 Cownt the Rectangles

Bessie the Cow found a piece of paper with the following figure printed on it. She wants to know how many rectangles are in the figure. Help her by finding the number of rectangles of any size that is in this figure, including rectangles which contain multiple smaller rectangles.



17 Soccow

Rancher Cedric decided to hold a soccow tournament for his cows. Bessie the Cow's team, the Tactful Tauruses, lost 8 of their first 10 games. If they will play 30 more games in this tournament, how many of

the remaining games do they need to win in order to make the total number of games which they won at least twice as much as the total number of games which they lost?

18 Green Cows 1

Help Bessie the Cow answer the question “How much grass can a green cow chow if green cows can chow grass?” Bessie and Elsie both chow grass at constant rates. If Bessie can chow all the grass in a field in 3 hours and Elsie can chow all the grass in the same field in 4 minutes, how long will it take for them to chow all the grass in this field together? Your answer must be exact.

19 Green Cows 2

Bessie the Cow still hasn’t figured out how much grass a green cow can chow if green cows can chow grass. If 5 green cows can chow 8 square meters of grass in 20 minutes, how many green cows are needed to chow 10 square meters of grass in at most 15 minutes? Assume that all green cows in this problem chow grass at the same constant rate.

20 Moogic

Bessie the Cow wanted to learn how to do magic, but she got distracted on the internet and ended up learning about magic squares. In a magic square, the sum of the numbers in each row, each column, and the two diagonals are the same. (One diagonal contains the numbers 4, 16, and 28, while the other contains 17, 16, and 15.) If exactly two numbers are changed in this grid, the result is a magic square. Which two numbers must be changed and what values should they be changed to?

4	29	15
27	16	3
17	7	28

21 Mooish

Farmer Paul has two types of cows: truthful cows and falsy cows. Physically, they are indistinguishable. They all speak mooish, and they can be distinguished by how they answer questions. The truthful cows always reply truthfully, and the falsy cows always lie. Bessie the Cow had a conversation with three of Farmer Paul’s cows: Annabelle, Bossy, and Cornelius. Here’s a translation of the conversation.

Bessie: Are any of you falsy?

Annabelle: At least one of us is falsy.

Bessie: Are Bossy and Cornelius both truthful?

Bossy: Yes.

Bessie: Are Annabelle and Bossy both truthful?

Cornelius: No.

What is the type of each cow?

22 Cowkies

When Bessie the Cow was visiting a nearby farm, she noticed that there is a large group of cows. She brought some cookies to make new cow friends, but she didn’t know how many cows there were in the group! She counted a total of 87 black spots and 83 white spots, not including her own spots. Each cow either has two black spots and three white spots or three black spots and two white spots. How many cows are in the group, not including Bessie?

23 Moorio Kart

Cowboy Alex gave Bessie the Cow a new racing game called Moorio Kart! She let all of her cow friends play, and then asked each cow whether they liked each of the three courses. 86 cows said they liked Bowser Cowstle, 25 cows said they liked Cowconut Mall, and 67 cows said they liked Moo Moo Meadows. Some cows might have liked two courses, and no cow liked all three courses. What is the fewest possible number of friends which Bessie could have had?

24 Moo York Bagels

Bessie the Cow now lives in Moo York and every day she buys a bagel from Billie the Bagel Cow. The type of bagel that she buys depends on her mood. If Bessie is happy, she will spend \$1000 on a toasted blueberry bagel. If Bessie is sad, she will spend \$620 on a strawberry cream cheese bagel. On any given day Bessie has a 68% chance of being happy. On average, how much does Bessie spend on the bagels each day? Round your answer to the nearest cent.

25 Mooilk

Farmer Julia wants to measure out exactly 25.5 gallons of milk in a large storage bin. The bin is initially empty. Farmer Julia has a 2 gallon bucket and a 3.5 gallon bucket. In one move, she can add 2 gallons of milk to the bin or add 3.5 gallons of milk to the bin. If there is at least 5 gallons of milk in the bin, she can also remove 2 gallons of milk or remove 3.5 gallons of milk in one move. What is the least possible number of moves needed to end with exactly 25.5 gallons of milk in the bin?